IN THE SPECIFICATION

Please amend the substitute specification filed on January 14, 2004 as a Preliminary Amendment as follows:

[0010] For example, Japanese Patent Application Publication No. Hei 7-123421 and No. 2000-244821 and Japanese Patent Publication No. ~~255285~~ 2552855, which will be described later as Patent Document 1, Patent Document 2 and Patent Document 3, respectively, discloses propositions relating to optical path length control and/or spatial frequency characteristic control by operating an optical LPF in a conventional digital camera.

[0022] Fig. 1A shows an arrangement of a combination of a camera body and interchangeable lens, an optical member and an image pickup element in a digital camera system according to a first embodiment of the invention and shows a combination of a reference camera body and an interchangeable lens;

[0023] Fig. 1B shows an arrangement of a combination of a camera body and interchangeable lens, an optical member and an image pickup element in the digital

camera system in Fig. 1A and shows a combination of a non-reference camera body and an interchangeable lens;

[0054] In the digital camera system according to this embodiment having the above-described construction, the interchangeable lens barrel 12 can be attached to the reference first camera body 11A. The first camera body 11A contains the image pickup element 5A having the predetermined reference pixel pitch δ0. A subject luminous flux from an interchangeable lens are double-~~reflected~~ refracted by the optical LPF 8A and form an image properly on the image converting surface 5Aa of the image pickup element 5A without a curvature-of-field aberration.

[0055] The interchangeable lens barrel 12 can be attached to the non-reference second camera body 11B. The second camera body 11B contains the image pickup element 5B having a pixel pitch δ1. A subject luminous flux from an interchangeable lens passes through the compensating optical element 9, is double ~~reflected~~ refracted by the optical LPF 8B, and forms an image on the image pickup conversion surface 5Ba of the image pickup element 5B. The amount of the change in effective optical path length due to the thin optical LPF 8B is compensated by inserting the compensating optical element 9. The subject luminous flux forms an

image properly without the curvature-of-field aberration similarly on the image pickup conversion surface 5Ba of the image pickup element 5B.

[0059] The first camera body 11A and the second camera body ~~12A~~ 11B have a common construction except for the image pickup element of the image pickup unit and the optical LPF, which are to be contained.

[0067] The reflector 13b is freely movably arranged between a position evacuated from the optical axis of the photographic optical system 12a and a predetermined position on the optical axis. The reflector 13b is normally disposed at a predetermined angle, such as 45□, on the optical axis of the photographic optical system 12a with respect to the optical axis. Thus, when the camera 1 is at the normal state, a subject luminous flux having passed through the photographic optical system 12a are bent by the reflector 13b and are ~~reflected~~ refracted toward the pentaprism 13a above the reflector 13b.

[0100] The crystal plates 8a, 8c, and 8d and the infrared absorbing glass 8b have ~~reflective~~ refractive indexes close to that of glass and have a thickness ts0. The photoelectric conversion surface 5Aa of the image pickup element 5A is positioned at the image forming position of a subject luminous flux based on the

effective light path length in accordance with the ~~reflective~~ refractive index and the thickness ts0. Therefore, a subject luminous flux captured by the lens barrel 12 can form an image properly on the photoelectric conversion surface 5Aa of the image pickup element 5A without the curvature-of-field aberration. More strictly speaking, the thickness of the protection glass 6 and dust-preventive filter 21 also contributes to the change in effective optical path length. However, the protective glass 6 and the dust-preventive filter 21 have the same thickness in the first camera body and the second camera body. Therefore, the effective optical path length in accordance with the protective glass 6 and dust-preventive filter 21 do not differ between the first camera body and the second camera body.

[0105] The optical LPF 8B has a thickness ts1 for a double-~~reflecting~~ refracting subject luminous flux in accordance with the pixel pitch δ1 of the image pickup element 5B (Fig. 6). The optical LPF 8B may be crystal or an LN element.

[0106] The compensating optical element 9 has a thickness ti1 for compensating an amount of change in effective optical path length due to the change of the optical LPF 8B into the thickness ts1 thinner than the thickness ts0 (Fig. 6). In other words, the compensating optical element 9 is an optical element, such as a glass plate having a ~~reflective~~ refractive index substantially equal to that of crystal and not having a double refraction characteristic. The sum of the thickness ts1 of the optical LPF 8B and the thickness ti1 of the compensating

optical element 9 is set equal to the thickness tS0 of the optical LPF 8A. The compensating optical element 9 is fixed to the optical LPF 8B with an optical adhesive.

[0109] On the other hand, when the pixel pitch δ1 of the image pickup element 5B of the second camera body 11B is larger than the reference image pitch δ0, 7 μm, that is, when the number of pixels of the image pickup element 5B is lower than the number of pixels of the image pickup element 5A, an LN element is applied as the optical LPF 8B so as not to further increase the thickness of the optical LPF. The thickness ts1 of the LN element extremely decreases as shown in Fig. 9 due to the double refraction characteristic in accordance with the increase in the pixel pitch. However, the thickness is 0.1 mm or larger and can be produced. Then, the compensating optical element 9 having the thickness ti1 equal to the amount of the decrease in thickness of the optical LPF 8B having an LN element is bonded to the optical LPF 8B (but, strictly speaking, the thickness ti1 of the compensating optical element 9 must be determined in consideration of the difference in ~~reflective~~ refractive index between the LN element and the crystal). This allows a subject to form an image properly on the photoelectric conversion surface 5Ba (Fig. 1B) of the image pickup element 5B at the same position as that of the image pickup element 5A. The thickness of the optical LPF 8A of the first camera body 11A is the thickest in those of the optical LPFs in the other non-reference camera body such as the second camera body 11B.

[0110] As described above, when interchangeable lens barrels 12 are attached to the first camera body 11A and the second camera body 11B in a digital camera

system according to this embodiment, the optical LPF 8A or 8B having different thickness (where the optical LPF 8B is thinner) is applied so as to double-refract a subject luminous flux in accordance with the pixel pitches. In this case, the first camera body 11A is a reference camera body containing the reference image pickup element 5A. The second camera body 11B contains the image pickup element 5B having a pixel pitch different from that of the first camera body 11A. In order to compensate the displacement of an image-forming position due to the decrease in thickness, the compensating optical element 9 is provided in the second camera body side. The provided compensating optical element 9 can allow the subject luminous flux properly to form an image on the photoelectric conversion surface of the image pickup element 5B ~~with~~ without the curvature-of-field aberration.

[0114] On the other hand, a thin optical low pass filter is preferably used for reducing the size of a camera. However, a much thinner optical low pass filter may be difficult to produce and may be easily destroyed, which is not preferable. An optical low pass filter containing an LN element for the image pickup element having the pixel pitch δ lower than ~~6.31~~ about 6 μm is difficult to produce.

[0122] The infrared cut filter 8D has the same ~~reflective~~ refractive index as that of crystal but does not have a double refraction characteristic. The infrared cut filter 8D is set to have a thickness ti2 enough to absorb infrared rays.

[0123] A subject luminous flux captured through the attached interchangeable lens barrel 12 forms an image on the photoelectric conversion surface 5Aa (Fig. 1A) of the image pickup element 5A through the dust-preventive glass 21, the infrared cut filter 8D, the optical LPF 8C and the protective glass 6.

The photoelectric conversion surface 5Aa is positioned at the position where the curvature-of-field aberration does not occur in consideration of an amount of the change in effective optical path length based on the ~~reflective~~ refractive index of the optical LPF 8C.

[0126] The infrared cut filter ~~8D~~ 8F has the same ~~reflective~~ refractive index as that of crystal but does not have a double refraction characteristic. The infrared cut filter ~~8D~~ 8F has a thickness ti3 enough for absorbing infrared rays and for compensating an amount of the decrease in thickness of the optical LPF 8E. In other words, the thickness of the infrared cut filter ~~8D~~ 8F is increased by an amount of the difference in thickness between the optical LPF 8E and the optical LPF 8C. The sum ti3 + ts3 of thickness of the infrared cut filter 8F and the optical LPF 8E is set substantially equal to the sum ti2 + ts2 of thickness of the infrared cut filter 8D and the optical LPF 8C. Therefore, a subject luminous flux captured through the interchangeable lens barrel 12 can form an image properly on the photoelectric conversion surface 5Ba (Fig. 1B) of the image pickup element 5B through the dust-preventive glass 21, the infrared cut filter 8F, the optical LPF 8E and the protection glass 6 in the second camera body 11D without the occurrence of the curvature-of-field aberration.

[0127] When the pixel pitch δ1 of the image pickup element 5B applied to the second camera body 11D is smaller than the reference pixel pitch δ0, the thickness ts3 of the optical LPF 8E is thinner while the thickness ti3 of the infrared cut filter 8 is increased by the amount of the decrease in the thickness ts3 like the first embodiment. When the pixel pitch δ1 of the image pickup element 5B applied in

the second camera body 11D is larger than the reference pixel pitch $\delta 0$, a thinner LN element is applied as the optical LPF 8E like the first embodiment. The thickness ts3 is thin but still can be produced (0.1 mm or larger). The thickness ti3 of the infrared cut filter 8F is increased by the amount of the decrease in the thickness ts3 (where, strictly speaking, the thickness ti3 of the infrared cut filter 8F must be determined in consideration of the difference in ~~reflective~~ <u>refractive</u> index between an LN element and crystal). Therefore, the sum of the thickness of the infrared cut filter 8F and the optical LPF 8E does not change substantially, and the image pickup unit ~~15D~~ <u>15C</u> and the image pickup unit 15D take up the same amount of space. The thickness of the optical LPF 8C of the first camera body 11C is the thickest in the optical LPFs built in the other non-reference camera bodies such as the second camera body 11D.